



Berryman

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August 18, 2023

Drew Brown
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1500 ParkCentre
525 South Main Street
Tulsa, Oklahoma 74103

**Re: Robert Bales and
Danielle Bales,
Plaintiffs,**

v

**State Farm Fire and
Casualty Company,
Defendant.**

**In the United States District Court
For The Western District of Oklahoma
Case #: 22-cv-00851**

Dear Mr. Brown:

The following report details to date my pertinent opinions and can be changed only in writing by the undersigned. The following opinions are based upon my review of the documentation provided to me and the observations made during my inspection of the subject property conducted on August 2, 2023. In forming my opinions, I utilized my twenty-five (25) years of experience as an evaluator and estimator of property damage as well as my formal education, training, and knowledge previously acquired including but not limited to: building codes, governmental regulations, and construction standards. I reserve the right to supplement this report to address additional information made available to me.

Farm's position that the shingles were not damaged by hail did not change. State Farm did note additional damage to the gutters.

8. State Farm revised their estimate to include the additional gutter damage and to include the temporary repair completed by OCR. The total of the revised estimate was \$4,299.30.⁸
9. A lawsuit was filed on behalf of Bales on September 1, 2022.
10. R. Sean Wiley (Wiley) of JW Construction Management & Construction Consulting submitted an expert report dated August 4, 2023.

DISCUSSION

Hail

- Hail fall is almost always directional. Hail of sufficient size, shape, and density, etc., will tend to damage the roof shingles and appurtenances which are facing the advancing hail. Under sufficient conditions it will tend to damage the roof coverings on those slopes which are facing the advancing hail and often not damage those roof coverings on the opposite slopes. Since it is directional, it rarely impacts or causes damage to all four directional slopes of a roof and/or building elevations during the same hail event.
- It is common when evaluating a roof for hail damage to inspect other collateral building components for indices of hail impact and hail size. Hail often leaves spatter, dents, or other signatures on adjacent building components that can offer historical evidence of the size of hail fall. Scientific research has correlated these dent sizes with the size of hail that caused the marker.⁹ For instance, hail will leave a dent in a light gauge metal vent cap that is as much as three times (3x) the actual size of the hail stone. As an example, a pea size hailstone, 1/4" in diameter, can cause a 3/4" dent in a metal vent cap. One of the best indicators of hail size is the impressions left in the exposed cooling fins of an HVAC condenser unit. The relationship between the dents is approximately 0.80-to-1, meaning the horizontal width of the dent represents 80% of the actual diameter of the hailstone. Such observations can help determine if hail has met the required threshold needed to damage the particular type of roof system on the building.

⁸ BALES CL 36-29L1-57B 0268 - 0302

⁹ Crenshaw, Vickie, and Jim D. Koontz. "Hail: Sizing It Up" <http://jdkoontz.com/articles/hailsize.pdf>

- Weather data reporting can be helpful in providing information about occurrence of hail fall and its size for given calendar dates and areas. Climatological reports can be a useful tool in assisting in the property damage process, especially when used in conjunction with reliable data that comes from a site inspection for the presence, nature, and extent of damages.
- All hail does not cause damage to every type of roofing membrane or system as different roof materials have different capacities to resist hail impact damage. Also, among other variables, the hail's size, direction, density, shape, angle of impact, and velocity play a role in the hail's propensity to cause damage. Simulating hail, ice ball impact testing research has established threshold hail sizes required to damage various roof systems.¹⁰ A 30-year laminated, composition shingle has an established 1.5" threshold size required to cause damage. Higher grade laminated, composition shingles are expected to have a greater resistance to hail damage and therefore will likely require hail larger than 1.5" in size to cause damage. Lower grade 3-tab shingles, oftentimes used to cover the ridge rows of laminated, composition roofs, have a lower hail damaging threshold size.
- Functional damage caused by hail to a roof can be defined by the diminution of the water-shedding capability or the reduction of the expected life of the roofing material.

Wind

- As wind approaches and begins to negotiate a structure in its pathway, the roof is subjected to increasing pressure on the windward side (wind facing) and reduced pressure on the leeward side (side opposite to the wind's direction).
- Wind turbulence increases as the wind encounters changes in the roof's overall geometry; hence, pressures fluctuate and tend to increase along the roof's eaves, gable ends, ridges, and valleys. It is in these roof areas where the roof is most susceptible to damage. It is by this mechanism that the wind-resistance characteristics of a roof covering are challenged. One would expect to see wind damages at these more vulnerable areas before seeing wind damages to the field areas, i.e., the wider, open expanses of the roof system.
- Wind is usually directional and most often does not cause wind damage to all directional roof slopes during the same elevated wind event. Wind

¹⁰ "Hail Damage Threshold Sizes for Common Roofing Materials," Marshall, et al., Haag Engineering.

Roof systems30-year laminated, composition shingles

- Laminated asphalt shingles are comprised of bitumen asphalt integrated into fiberglass reinforcements and covered with a ceramic granule surface. Hail damage to asphalt composition shingles often manifests itself as a puncture or damage to the shingle's fiberglass reinforcement mat. Punctures and bruises to the fiberglass mat can oftentimes be seen but can be confirmed by feeling the blemish for the presence of the damaged shingle mat.
- Ice ball impact testing research has shown that in order to damage a 30-year laminated, asphalt composition shingle the hail must be at least 1.50" diameter and impact the roof surface at a 90-degree angle.¹⁵
- Typically, the peaks or ridges of a roof are covered with thinner more malleable materials which are prone to damage caused by hail smaller than that required to damage the 30-year laminated, composition shingles.
- Many causes of shingle granule loss can be experienced, especially as a roof ages. Those issues can include: manufacturing defects; ruptured, open blisters; worn areas or punctures in the shingles from improperly installed fasteners; footfall;¹⁶ and expected granule loss caused by the aging and weathering of the roof.¹⁷

INSPECTION OBSERVATIONS

The following were observations made of the subject property's roof system and exterior elevations during my inspection on August 2, 2023. Also present at the inspection was the Plaintiffs' expert in this matter, R. Sean Wiley. An inquiry was made as to whether any interior water damage was present due to intrusion of water through the roof or exterior building envelope. No interior damage was reported; therefore, an inspection of the interior was not made.¹⁸

¹⁵ "Hail Damage Threshold Sizes for Common Roofing Materials," Marshall, et al., Haag Engineering.

¹⁶ Damage caused to a shingle by walking on it. The more foot traffic on a roof, the greater the amount of footfall is expected.

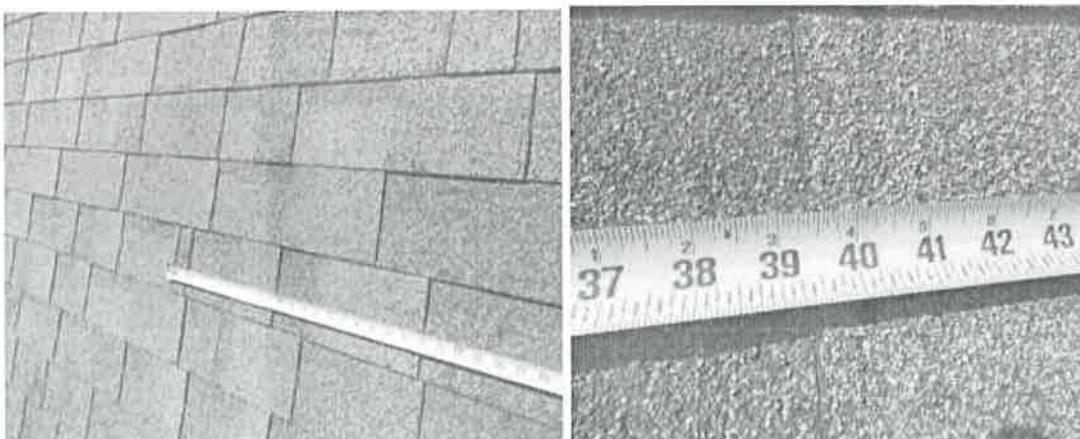
¹⁷ Lower sloped roofs typically loose granules and age at a faster pace due to the slower drainage of water from the shingles' surface.

¹⁸ Photos contained within this report are meant to be representative samples and do not represent all observations made during the inspection. A total of 826 photos are attached to this report.

Roof. The subject roof and soft metals were inspected for the presence of hail and wind damage. The inspection included test square¹⁹ evaluations of each directional slope of the roof. The examination of the test squares included industry standard evaluations of the shingles including visual and tactile assessment of noted blemishes within the shingles.

Shingle Type.

- The shingles are a laminated, composition shingle. Without conducting some manner of destructive testing, the manufacturer of the shingle could not be precisely confirmed. However, the dimensions of the shingles were found to be 39 3/8" wide with an installed exposure of 5.5". Based on these dimensions, the shingle is likely manufactured by one of the leading manufacturers of shingles including: Tamko; Owens Corning; and GAF.



Documentation of the shingle width being 39 3/8"

¹⁹ A test square is routinely conducted by storm-damage evaluators to assay a roof for evidence and number of hail strikes that damaged the roof. It is developed by randomly selecting a 100 square foot area of the roof on a directional roof slope. The test square is examined using industry standard techniques to determine the presence and number of hail strikes within the designated test area.



WEATHER HISTORY

The National Oceanic and Atmospheric Administration (NOAA) hail reports for Tulsa County were reviewed for the dates between November 10, 2020 (the date the subject property was purchased) to February 18, 2022 (the date of State Farm's second inspection). The largest hail reported in Tulsa County between these dates was 1" in diameter. NOAA records all hail >0.75" diameter or larger.

Storm Events Database

Data Access

- CSV: [Full Data Download \(CSV\)](#)
- [Storm Data Publication](#)

Documentation

- [Storm Events Database](#)
- [Event Types](#)
- [Storm Data CSV](#)
- [API Terms & Conditions](#)
- [API v1.0.4 Schema](#)

External Resources

- [Storm Events Reports](#)
- [NOAA NHC Page](#)
- [NOAA NWS Page](#)
- [NOAA Hurricane Database](#)
- [NOAA Tornado Database](#)
- [NOAA Drought Images](#)
- [NOAA](#)
- [NOAA Climate Data](#)

Data Export: (current results)

[CSV](#) [PDF](#) [CSV Download Documentation](#)

Storm Events Database

Search Results for Tulsa County, Oklahoma

Event Types: Hail

6 Events were reported between 01-16-2020 and 02-16-2022 (466 days)

Summary Info

Number of County/Zone areas affected	1
Number of Days with Event	4
Number of Days with Event and Death	0
Number of Days with Event and Death or Injury	0
Number of Days with Event and Property Damage	0
Number of Days with Event and Crop Damage	0
Number of Event Types reported	1

Column Definitions:
Mag: Magnitude, Dth: Deaths, Inj: Injuries, Pd: Property Damage, Cd: Crop Damage

Click on **Location** below to display details
Available Event Types have changed over time. Please refer to the [Database Details](#) for more information

Select: All Hail Sort By: Date/Time (Oldest)

Location	County/Zone	St	Date	Time	TZ	Type	Mag	Dth	Inj	Pd	Cd
Totals:											
BROKEN ARROW	TULSA CO	OK	03/17/2021	12:53	CST-6	Hail	1.00 in	0	0	0.00K	0.00K
BROKERS	TULSA CO	OK	03/17/2021	13:42	CST-6	Hail	1.00 in	0	0	0.00K	0.00K
BROKERS	TULSA CO	OK	11/10/2021	10:46	CST-6	Hail	0.75 in	0	0	0.00K	0.00K
BROKEN ARROW ARPK	TULSA CO	OK	11/24/2021	22:10	CST-6	Hail	0.75 in	0	0	0.00K	0.00K
DEA TULSA	TULSA CO	OK	12/05/2021	20:25	CST-6	Hail	1.00 in	0	0	0.00K	0.00K
DEA TULSA KILBURN	TULSA CO	OK	12/05/2021	20:06	CST-6	Hail	1.00 in	0	0	0.00K	0.00K
DEA TULSA	TULSA CO	OK	12/05/2021	21:10	CST-6	Hail	1.00 in	0	0	0.00K	0.00K
DEA TULSA KILBURN	TULSA CO	OK	12/05/2021	21:11	CST-6	Hail	1.00 in	0	0	0.00K	0.00K
Totals:											

OPINIONS

Opinion #1: Dents in the soft metals of the subject property shows that hail has impacted these components at some point during the fixtures service life. However, the small dents in these soft metals indicates the hail was too small to have met the threshold required to damage a 30-year laminated, composition roof. The cosmetically damaged metal appurtenances can be removed and replaced in an industry standard manner without requiring the replacement of the entire roof.

1. I conducted test squares on each of the subject roofs directional facing slopes. The test squares were analyzed for hail damage in an industry standard manner. Each of the test squares exhibited no wind or hail damage.